

PUBLIC EMPLOYEES' RETIREMENT SYSTEM

STATE OF MONTANA

ACTUARIAL VALUATION

AS OF JULY 1, 1992

STATE DOCUMENTS COLLECTION

JUL 15 1993

MONTANA STATE LIBRARY
1515 E. 6th AVE.
HELENA, MONTANA 59620

PLEASE RETURN

**Hendrickson, Miller
& Associates, Inc.**
ACTUARIAL CONSULTANTS



Public Employees' Retirement System

State of Montana

Actuarial Valuation

As of July 1, 1992



Public Employees' Retirement System

Table of Contents

	Page
<u>Section I</u>	
Introduction	1
Actuarial Certification	1
<u>Section II</u>	
Analysis of Valuation	2
<u>Section III</u>	
Schedule 1 - Normal Cost Allocation	4
Schedule 2 - Present Value of Benefits	5
Schedule 3 - Liability Allocation and Statutory Funding	6
Schedule 4 - Unfunded Liability Amortization Schedule	7
Schedule 5 - Comparison of Valuations	8
Schedule 6 -	
Table 1 - Number of Active Members	9
Table 2 - Average Salaries of Active Members	10
Table 3 - Number of Vested Inactive Members	11
Table 4 - Number of Retired Members	12
Table 5 - Average Benefits of Retired Members	13
Table 6 - Number of Disabled Members	14
Table 7 - Average Benefits of Disabled Members	15
Table 8 - Number of Survivors	16
Table 9 - Average Benefits of Survivors	17
<u>Section IV</u>	
Actuarial Funding Method	18
Discussion of Actuarial Assumptions	19
Illustration of Actuarial Assumptions	20
<u>Section V</u>	
Summary of Benefit Provisions	22



Public Employees' Retirement System

Section I

Introduction

An actuarial valuation of the Public Employees' Retirement System of the State of Montana has been completed as of July 1, 1992. This valuation was authorized by the Public Employees' Retirement Board under Section 19-3-305, MCA. The purpose of the valuation was to determine the financial position of the fund, the normal cost, and the unfunded accrued liability based upon present and prospective assets and liabilities of the system as of July 1, 1992.

Section II presents an analysis of the results of the actuarial valuation. The numerical findings and membership data supporting this analysis are shown in Section III.

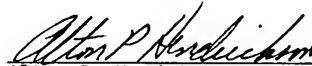
In conducting the actuarial valuation, certain assumptions were made as to the future experience of the system. A summary and discussion of each of the assumptions is contained in Section IV.

The valuation is based upon the Public Employees' Retirement Act and incorporates all amendments as of July 1, 1992. A summary of the major provisions of the Act is contained in Section V.

Actuarial Certification

The results of the actuarial valuation shown in this report are based upon information provided by the Public Employees' Retirement Division regarding plan participants, plan assets and other matters. The values have been calculated on the basis of actuarial assumptions which, in my opinion, are appropriate for purposes of this valuation.

This valuation has been prepared in accordance with generally accepted actuarial principles and practices and, to the best of my knowledge, fairly reflects the actuarial position of the Public Employees' Retirement System as of July 1, 1992.



Alton P. Hendrickson
Member, American Academy
of Actuaries

•

•

•

Public Employees' Retirement System

Section II

Analysis of Valuation

Results of Valuation

An actuarial valuation has been conducted for the Public Employees' Retirement System as of July 1, 1992. This valuation has determined that the percent of each member's compensation required to fund the benefits as they accrue in the future is 10.24%. The regular contribution rate of 13.38% allows 3.14% to be applied to the unfunded past service liability. This percent is sufficient to amortize the unfunded past service liability over a period of 18.25 years. The amortization period has decreased from 21.76 years in 1990.

Asset Valuation

Past actuarial valuations have valued assets at market value, with gain and loss fluctuations smoothed over a 6-year period. This procedure has been conservative and slow to recognize recent market performance. The current actuarial valuation has accelerated the rate at which gains and losses are recognized by smoothing the fluctuations over a shorter period of 4 years. The table below illustrates this valuation procedure:

	Actual		Adjusted
	-----		-----
Cost Value as of 6/30/92	1,007,708,403		1,007,708,403
1992 Market Gain	62,193,025	x .25	15,548,256
1991 Market Gain	11,368,217	x .50	5,684,109
1990 Market Gain	5,643,367	x .75	4,232,525
Prior Market Gain	100,028,366	x 1.00	100,028,366
	-----		-----
Market Value as of 6/30/92	1,186,941,378		1,133,201,659

Investment Performance

The rate of investment return during 1991-92 was 14.22% on a market value basis and 9.28% on a cost value basis. These rates were based on all assets of the system including accruals, and assumed uniform fund activity throughout the year.

Contributions

The employer contribution has been 6.417% of compensation since 1983. To fund the retirement formula of 1/56 of final salary per year of service, this rate was increased to 6.55% on July 1, 1992. It will increase again on July 1, 1993 to 6.7%. The employee contribution rate was increased to match the employer rate as of July 1, 1992.



For purposes of this valuation, a weighted-average rate of 13.38% was used to reflect the current year's rate of 13.1% and future rates of 13.4%.

Amortization of The Unfunded Liability

An amortization schedule has been prepared as part of each biennial valuation to amortize new liability gains and losses over a 40-year period. The amortization period of past liabilities decreases 2 years with each valuation. The schedule began with an initial liability established on July 1, 1984.

The Public Employees' Retirement Board has set a goal of funding liabilities over a period not to exceed 30 years. The schedule in this report illustrates the rate required to fund each valuation's new liabilities over a 30-year period.

Actuarial Assumptions

The actuarial assumptions used in the valuation of July 1, 1990 were continued in this valuation. A review of the system's data and experience did not reveal any deviations which warranted a change.

Summary of Data

The active membership was 27,473 on July 1, 1992 with 15,211 females and 12,262 males. The number of active members grew by 973 from 26,500 on July 1, 1990. The annual payroll increased from \$476.6 to \$548.2 million during the biennium. The average pay per member grew at the rate of 5.3% per year.

The average active member is 43.1 years of age, was employed at age 35.6, has completed 7.5 years of service, and earns \$19,952.

The number of members receiving benefits was 10,734 on July 1, 1992 with 5,648 females and 5,086 males. The number receiving benefits grew by 650 from 10,084 on July 1, 1990. The annual benefit payout increased from \$51.1 to \$58.2 million during the biennium. The benefit payout per member grew at the rate of 7.0% per year.

The average retiree is 71.5 years of age, retired at age 61.0 with 18.4 years of service, and receives a benefit of \$456 per month.

Conclusion

Because of increased payroll and benefit payouts, the system's total liability grew by 18.1%. This was offset by a 23.2% growth in assets. The current funding level allows the system's unfunded liability to be funded over 18.25 years compared to 21.76 years in 1990. Part of this decrease is attributable to smoothing market value changes over 4 years rather than 6.

Based on the results of this valuation, the Public Employees' Retirement System is actuarially sound.

•

•

•

Public Employees' Retirement System

Section III

Schedule 1

Normal Cost Allocation

(1) Normal Cost Contribution Rate:

(a) Retirement	7.26%
(b) Death	0.24
(c) Disability	0.39
(d) Vested	1.82
(e) Withdrawals	0.53

(f) Total Rate	10.24%

(2) Present Value of Future Salaries Of Current Members	\$4,047,616,654
(4) Present Value of Future Normal Costs For Current Members (1(f) * (2))	\$ 414,475,945

Public Employees' Retirement System

Schedule 2

Present Value of Benefits

(1) Present Value of Benefits - Inactive Members

(a) Retirement	\$ 457,829,773
(b) Death	12,042,216
(c) Disability	35,942,445
(d) Vested	25,971,771
(e) Withdrawals	4,305,259
(f) Benefit Adjustment	5,417,781

(g) Total Inactive	\$ 541,509,245

(2) Present Value of Benefits - Active Members

(a) Retirement	\$1,005,916,222
(b) Death	21,902,610
(c) Disability	34,088,546
(d) Vested	161,617,243
(e) Withdrawals	59,740,260

(f) Total Active	\$1,283,264,881

(3) Total Liabilities \$1,824,774,126

•

•

•

Public Employees' Retirement System

Schedule 3

Liability Allocation and Statutory Funding

(1) Unfunded Past Service Liability

(a) Present Value of Benefits	\$1,824,774,126
(b) Present Value of Future Normal Costs	\$ 414,475,945
(c) Fund Assets	\$1,133,201,659 -----
(d) Unfunded Liability (a)-(b)-(c)	\$ 277,096,522

(2) Contribution Rates Amortized over 18.25 Years

(a) Present Value of Salaries During Next 18.25 Years	\$ 8,824,730,002
(b) Unfunded Contribution Rate (1(d)/2(a))	3.14%
(c) Normal Cost Rate (Schedule 1)	10.24 -----
(d) Statutory Funding Rate	13.38%

Public Employees' Retirement System

Schedule 4

Unfunded Liability Amortization Schedule

(1) Biennial Unfunded Past Service Liability Accounts

1984 Liability Account as of 7/1/90	\$ 339,798,229
Interest Charge on Liability Account	56,542,424
Contributions Applied to Liability	38,393,160
Interest Credit on Contributions	2,960,957
1984 Liability Account as of 7/1/92	\$ 354,986,536
1986 Liability Account as of 7/1/90	\$ -34,064,482
Interest Charge on Liability Account	-5,668,330
Contributions Applied to Liability	-3,848,881
Interest Credit on Contributions	-296,833
1986 Liability Account as of 7/1/92	\$ -35,587,098
1988 Liability Account as of 7/1/90	\$ 6,521,686
Interest Charge on Liability Account	1,085,209
Contributions Applied to Liability	736,873
Interest Credit on Contributions	56,829
1988 Liability Account as of 7/1/92	\$ 6,813,193
1990 Liability Account as of 7/1/90	\$ -34,340,529
Interest Charge on Liability Account	-5,714,264
Contributions Applied to Liability	-3,880,072
Interest Credit on Contributions	-299,239
1990 Liability Account as of 7/1/92	\$ -35,875,482

(2) Actuarial Gain/Loss

Current Unfunded Liability (Schedule 3)	\$ 277,096,522
Less 1984 Liability Account	354,986,536
Less 1986 Liability Account	-35,587,098
Less 1988 Liability Account	6,813,193
Less 1990 Liability Account	-35,875,482

1992 Liability Account as of 7/1/92	\$ -13,240,627

(3) Required Contribution Rate

Normal Cost Rate (Schedule 1)	10.24%
Rate to Fund 1984 Liability Over 22 Years	3.42
Rate to Fund 1986 Liability Over 24 Years	-0.32
Rate to Fund 1988 Liability Over 26 Years	0.06
Rate to Fund 1990 Liability Over 28 Years	-0.28
Rate to Fund 1992 Liability Over 30 Years	-0.10

Contribution Rate for 30-Year Schedule	13.02%

•

•

•

Public Employees' Retirement System

Schedule 5

Comparison of Valuations

	1990	1992
(1) Unfunded Past Service Liability	-----	-----
(a) Present Value of Benefits	\$1,545,249,012	\$1,824,774,126
(b) Present Value of Future Costs	\$ 347,343,154	\$ 414,475,945
(c) Fund Assets	\$ 919,990,954	\$1,133,201,659
(d) Unfunded Liability	\$ 277,914,904	\$ 277,096,522
(2) Amortization Period and Contribution Rates		
(a) Years for Amortization	21.76	18.25
(b) Unfunded Contribution Rate	3.11%	3.14%
(c) Normal Cost Rate	10.22%	10.24%
(d) Statutory Funding Rate	13.33%	13.38%
(3) Active Members		
(a) Number of Members	26,500	27,473
(b) Annual Payroll	\$ 476,613,100	\$ 548,152,580
(c) Average Annual Salary	\$ 17,985	\$ 19,952
(4) Inactive Members		
(a) Number of Retired	9,042	9,681
(b) Number of Disabled	821	831
(c) Number of Survivors	221	222
(d) Number of Vested Deferred	830	1,034
(e) Annual Benefits	\$ 51,074,089	\$ 58,182,895
(f) Average Monthly Benefit	\$ 422	\$ 452



Public Employees' Retirement System

Schedule 6

Table 1

Number of Active Members

Years of Service	Member's Age									Total
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	OVER 60	
0-4	842	1764	2249	2538	2422	1607	1017	626	433	13498
5-9	5	234	767	1089	1149	877	675	431	418	5645
10-14		9	388	811	790	674	587	472	315	4046
15-19			22	364	638	456	366	317	247	2410
20-24				9	197	349	245	205	169	1174
25-29					3	111	148	120	72	454
30-34						2	59	65	43	169
35-39							9	37	21	67
40-UP									10	10
Total	847	2007	3426	4811	5199	4076	3106	2273	1728	27473



Public Employees' Retirement System

Table 2

Average Salaries of Active Members

Years of Service	Member's Age									
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	OVER 60	Total
0-4	14753	17341	17740	17471	17439	17348	17117	17509	15070	17207
5-9	16714	19565	21380	21195	20579	19203	18720	17916	16367	19810
10-14		20351	22312	24593	24302	22624	19563	19972	17899	22190
15-19			25221	25534	28094	26809	23845	22049	20373	25206
20-24				24573	29010	30525	27855	25280	23600	27755
25-29					25177	32384	31654	27020	24922	29497
30-34						29217	31714	30856	27612	30311
35-39							33810	32736	30795	32272
40-UP									27361	27361
Total	14765	17614	19121	20138	20926	21222	20586	20563	18477	19952



Public Employees' Retirement System

Table 3

Number of Vested Inactive Members

Years of Service	Member's Age									Total
	20-25	25-29	30-34	35-39	40-44	45-49	50-54	55-59	Over 60	
0-4										
5-9	1	12	58	115	114	122	92	76	53	643
10-14		1	8	30	54	57	43	28	32	253
15-19				2	18	28	25	12	10	95
20-24						7	2	10	6	25
25-29							3	1	2	6
30-34								3	4	7
35-39								2	1	3
40-UP									2	2
Total	1	13	66	147	186	214	165	132	110	1034



Public Employees' Retirement System

Table 4

Number of Retired Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4						10	20	30	26	86
5-9			35	75	223	385	449	353	154	1674
10-14	3		30	97	275	486	508	434	475	2308
15-19	3		17	72	275	420	420	320	320	1847
20-24	5		10	30	233	301	322	239	222	1362
25-29	4	3	35	55	147	196	189	140	127	896
30-34	1	13	80	159	221	199	197	92	118	1080
35-39	4		2	19	48	63	73	52	75	336
40-UP	1			1	8	16	21	15	30	92
Total	21	16	209	508	1430	2076	2199	1675	1547	9681

Public Employees' Retirement System

Table 5

Average Benefits of Retired Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4						102	76	70	75	76
5-9			109	140	147	159	144	144	143	147
10-14	205		183	208	263	275	264	236	218	248
15-19	295		354	293	437	429	375	349	305	377
20-24	367		432	497	634	591	526	459	399	524
25-29	413	941	888	910	857	796	686	590	500	718
30-34	1079	1447	1337	1253	1083	948	868	747	574	983
35-39	519		1461	1596	1399	1270	1117	915	698	1083
40-UP	639			354	1874	1339	1477	1147	822	1199
Total	418	1352	768	682	574	482	427	354	337	456



Public Employees' Retirement System

Table 6

Number of Disabled Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4	5	4	3	4	1	6	12	14	8	57
5-9	38	21	32	53	43	42	34	14	19	296
10-14	12	7	17	31	40	41	22	20	27	217
15-19	12	5	10	27	26	24	13	9	10	136
20-24		5	11	14	18	13	10	6	5	82
25-29		1	1	4	9	7	6	2	5	35
30-34				1		1			4	6
35-39									2	2
40-UP										
Total	67	43	74	134	137	134	97	65	80	831

•

•

•

Public Employees' Retirement System

Table 7

Average Benefits of Disabled Members

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4	314	341	397	399	320	419	348	358	291	352
5-9	340	307	316	336	319	344	341	331	292	328
10-14	393	425	376	331	321	366	338	381	323	350
15-19	441	476	369	406	402	406	384	526	365	411
20-24		604	695	600	540	410	527	519	393	542
25-29		706	686	812	696	624	485	483	482	616
30-34				1229		764			483	654
35-39									486	486
40-UP										
Total	366	393	401	399	389	389	375	401	344	385

Public Employees' Retirement System

Table 8

Number of Survivors

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9	2		1	3	2	5	3	1		17
10-14	3	1		2	8	9	8	7	9	47
15-19	3		1	4	9	8	5	5	12	47
20-24		1	1		6	5	6	5	12	36
25-29			2	5	2	6	5	5	11	36
30-34				2	3	5	5		3	18
35-39				1	1	2	1		6	11
40-UP	2				1	3			4	10
Total	10	2	5	17	32	43	33	23	57	222

Public Employees' Retirement System

Table 9

Average Benefits of Survivors

Member's Service	Recipient's Age									Total
	< 45	45-49	50-54	55-59	60-64	65-69	70-74	75-79	Over 80	
0-4										
5-9	161		308	129	212	231	176	309		202
10-14	280	244		377	272	288	303	275	287	288
15-19	323		238	348	528	450	397	332	343	398
20-24		428	702		571	589	472	454	411	487
25-29			854	1098	772	519	558	536	446	617
30-34				1470	1146	1168	925		584	1033
35-39				2138	1106	1760	1653		655	1122
40-UP	666				1603	1021			769	907
Total	346	336	591	770	577	601	510	385	444	520

Public Employees' Retirement System

Section IV

Actuarial Funding Method

The cost of the retirement system will be determined by its future experience. In calculating the financial requirements of the fund, certain assumptions were made as to the expected future experience. This section summarizes the funding method applied as well as the actuarial assumptions used.

Any variations in the actual experience of the fund from those assumed in this valuation may cause changes in the projected future costs of the fund. It is therefore necessary that the actuarial assumptions be reviewed from time to time with adjustments as experience warrants. It is also important that regular valuations be performed to determine the financial effect of variations between the actual and assumed experience.

The assumptions used in the valuation are based upon the past experience of the fund together with projections as to future experience.

The method of funding employed is commonly referred to as the entry age normal cost method. This method establishes a normal cost as well as an unfunded accrued liability. The normal cost is the level percentage of total salaries required to fund the benefits, assuming this percentage has been contributed since each member's entry into the fund.

The unfunded accrued liability represents the excess of the present value of total liabilities over the present value of the fund assets and the present value of expected future contributions at the normal cost rate.

In order to maintain the fund on an actuarially sound basis, the rate of contribution should be such as to provide for the normal cost in addition to making progress towards the amortization of the unfunded liability.



Public Employees' Retirement System

Discussion of Actuarial Assumptions

Mortality Rates

The mortality rates for males and females are based upon the 1983 Group Annuity Mortality Table, and apply to both active members and those receiving benefits.

Disability Rates

The disability rates for males and females are based upon the 1983 Disability Table.

Withdrawal Rates

The withdrawal rates are based upon the actual experience of the system as determined in the 1987 withdrawal experience study.

Salary Scale

The rates of salary increase are based upon an assumed compounded growth rate of 6.5% per annum.

Investment Earnings

It was assumed that the investment earnings would be 8% compounded annually.

Asset Valuation

The assets are based on market value, with gains and losses graduated over a 4-year period.

Administrative Expenses

It was assumed that the system would incur no administrative expenses beyond those provided by investment earnings in excess of 8% and a \$1 per member annual fee.

Termination Benefits

It was assumed that all members terminating with less than five years of service would receive an immediate withdrawal of their member contributions with interest. It was further assumed that members with five or more years of service would select the most advantageous benefits under the given assumptions.



Public Employees' Retirement System
Illustration of Actuarial Assumptions

Mortality Rates

The mortality rates are based upon the 1983 Group Annuity Mortality Table.

Age	Deaths Per 10,000 Male Members	Deaths Per 10,000 Female Members
25	5	3
30	6	3
35	9	5
40	12	7
45	22	10
50	39	16
55	61	25
60	92	42
65	156	71
70	275	124
75	446	240
80	741	429
85	1,148	699

Disability Rates

The disability rates are based upon the 1983 Disability Table.

Age	Disabilities Per 10,000 Male Members	Disabilities Per 10,000 Female Members
25	1	1
30	2	3
35	3	5
40	6	9
45	12	15
50	20	22
55	51	41
60	105	87

Withdrawal Rates

The withdrawal rates illustrated below reflect the turnover experienced by the Public Employees' Retirement System.

Age	Withdrawals Per 10,000 Male Members	Withdrawals Per 10,000 Female Members
25	1,686	2,203
30	1,150	1,514
35	757	996
40	565	776
45	460	632
50	354	489
55	259	374
60	172	259

Salary Scale

The salary increases are based upon an assumed compounded growth rate of 6.5% per annum.

Investment Earnings

Future investment earnings are assumed to be 8% compounded annually.

Asset Valuation

The assets are based on market value, with gains and losses graduated over a 4-year period.

Administrative Expenses

It was assumed that the administrative expenses would be recovered by investment earnings in excess of 8% and a \$1 per member annual fee.

Public Employees' Retirement System

Section V

Summary of Benefits and Contributions

- Employee Contributions - 6.55% of member's compensation, increasing to 6.70% on July 1, 1993.
- Employer Contributions - 6.55% of members' compensation, increasing to 6.70% on July 1, 1993.
- Retirement Benefit - Eligibility: Age 60 and 5 years of service, age 65, or 30 years of service regardless of age.
- Normal Form: Life payments with a death benefit equal to the balance of member's contributions not received at the date of death.
- Benefit: 1/56 of the final compensation for each year of service. The minimum benefit is the benefit purchased by twice the member's accumulated contributions.
- Early Retirement Benefit - Eligibility: Age 50 and 5 years of service or 25 years of service regardless of age.
- Benefit: Actuarial equivalent of the accrued benefit based on retirement at age 60.
- Disability Benefit - Eligibility: 5 years of service.
- Benefit: 90% of 1/56 of the final compensation for each year of credited service, with a minimum benefit of 25% of the final compensation.
- Death Benefit - Eligibility: While an active member or within 6 months following active membership.
- Normal Form: Return of accumulated contributions plus 1/12 of last 12 months compensation times years of service up to 6 years, unless payments made under workers' compensation.
- Termination Benefit - Prior to 5 years of service, return of member contributions. After 5 years, the member may elect the actuarial equivalent of the accrued benefit based on retirement at age 60.
- Benefit Adjustments - Investment earnings in excess of 8%, if any, are used to provide post-retirement increases.

